

# **Imagery use at the NASS Area Frame Survey Cropland Data Layer**

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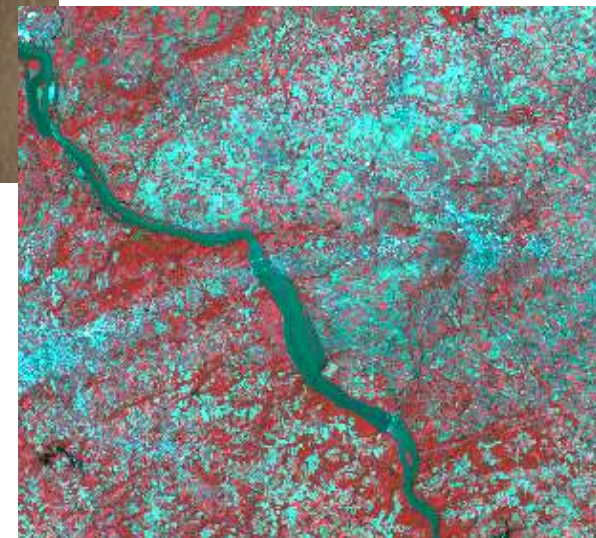
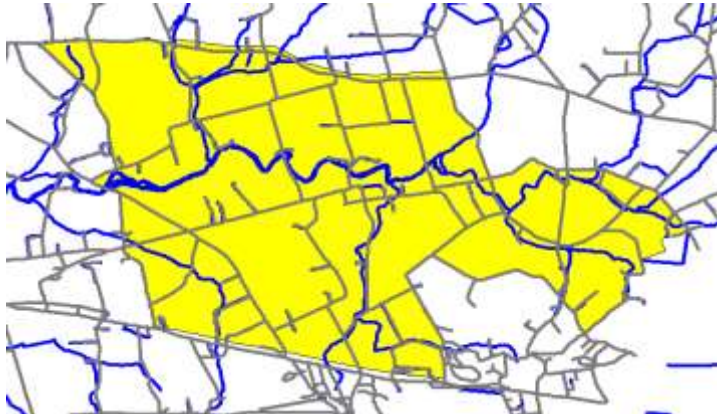
# NASS Area Frame Survey

- Purpose: Estimate major crop acreages for June 30 release date and measure under coverage of list surveys
- Sample size: ~11,000 typically 1 square mile
- Advantage: Complete frame giving all farms a chance to be selected
- Disadvantage: Expensive since with personally enumerate costing > 5 mil



# Stratification Materials

- State and county estimates
- Satellite imagery
- Raster maps
- Vector maps
- NAIP



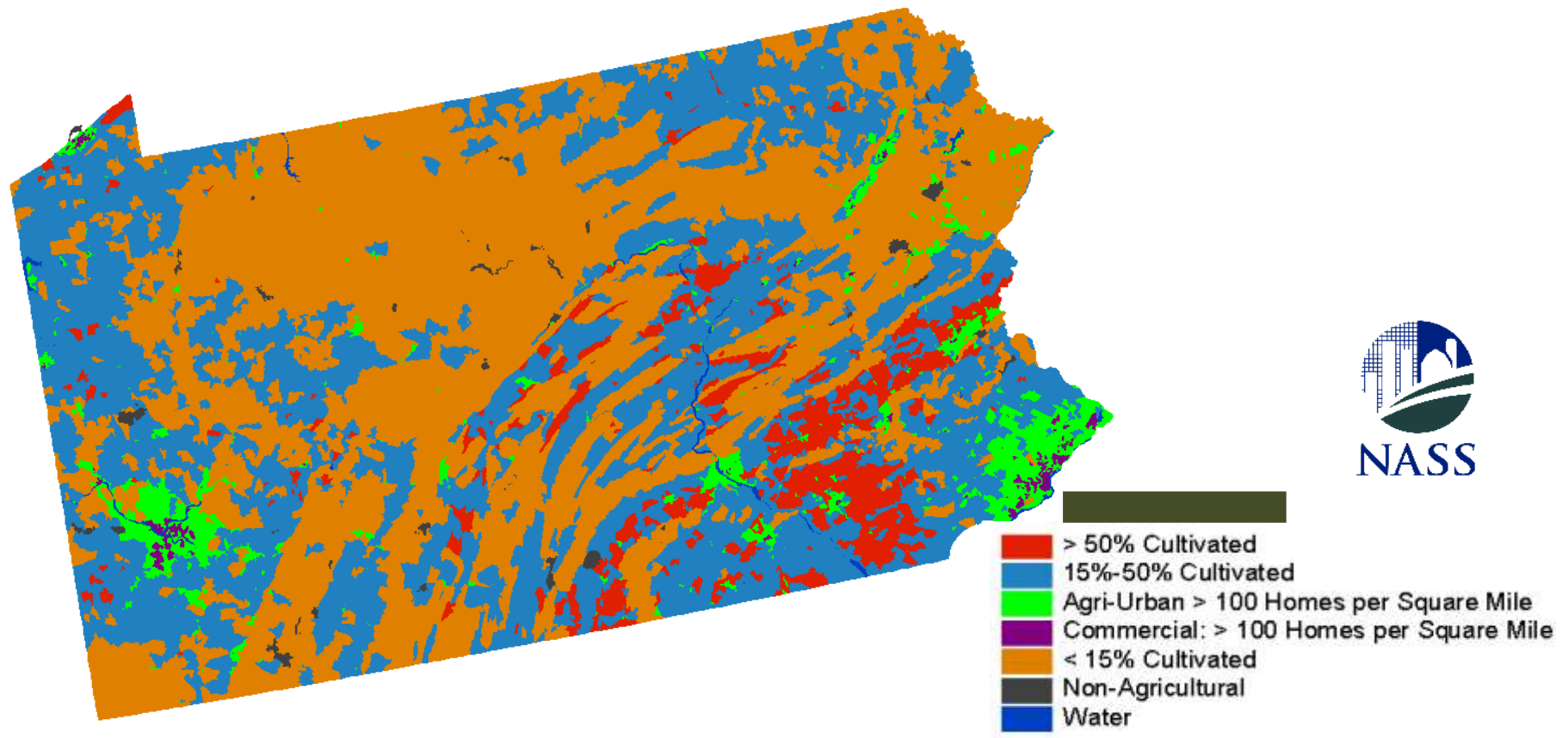
	545 - Wheat	67 - Corn for grain	70 - Corn for silage	787 - Harv Crop	88 - Soybeans
	Weighted Total	Weighted Total	Weighted Total	Weighted Total	Weighted Total
LANCASTER	11,877	94,504	74,128	293,313	29,602
LAWRENCE	2,256	15,645	4,657	47,883	3,406
LEBANON	5,208	27,565	16,041	85,574	14,330
LEHIGH	8,106	37,998	794	75,696	13,789
LUZERNE	1,511	7,276	1,496	28,410	1,139
LYCOMING	1,498	21,485	6,403	68,788	4,817

# Stratum Definitions

Stratum	Percent Cultivated	Segment Size
13	>50% Cultivated	1.00 sq. mi.
20	15-50% Cultivated	1.00 sq. mi.
31	Ag Urban	0.25 sq. mi.
32	Commercial	0.10 sq. mi.
40	<15% Cultivated	2.00 sq. mi.
50	Non-Ag	PPS

# Product: Land Use Stratification Map of Statewide Merged Strata Values

## Stratification of Pennsylvania 1999





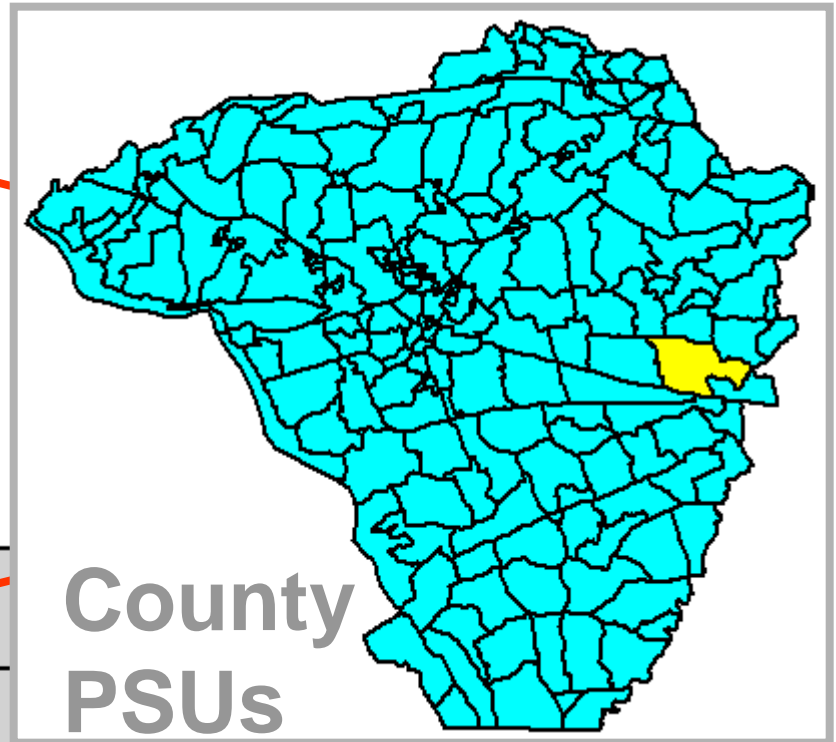
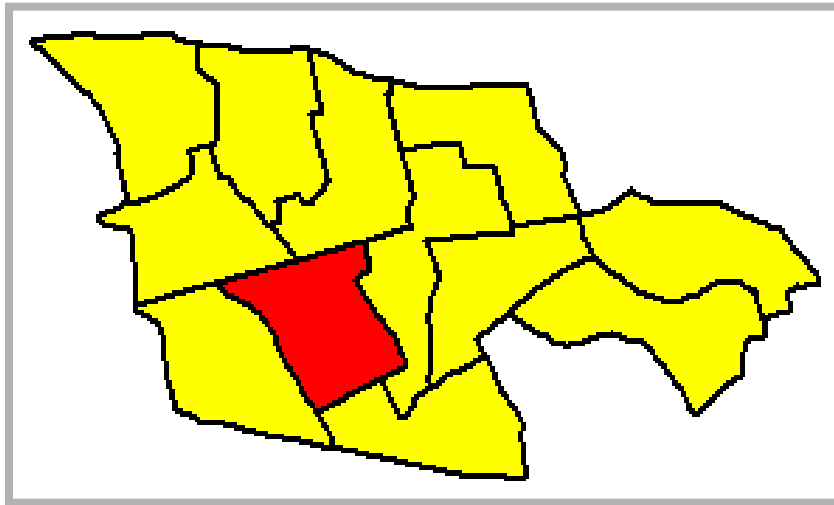
# Primary Sampling Units (PSUs)

## Pennsylvania Area Frame

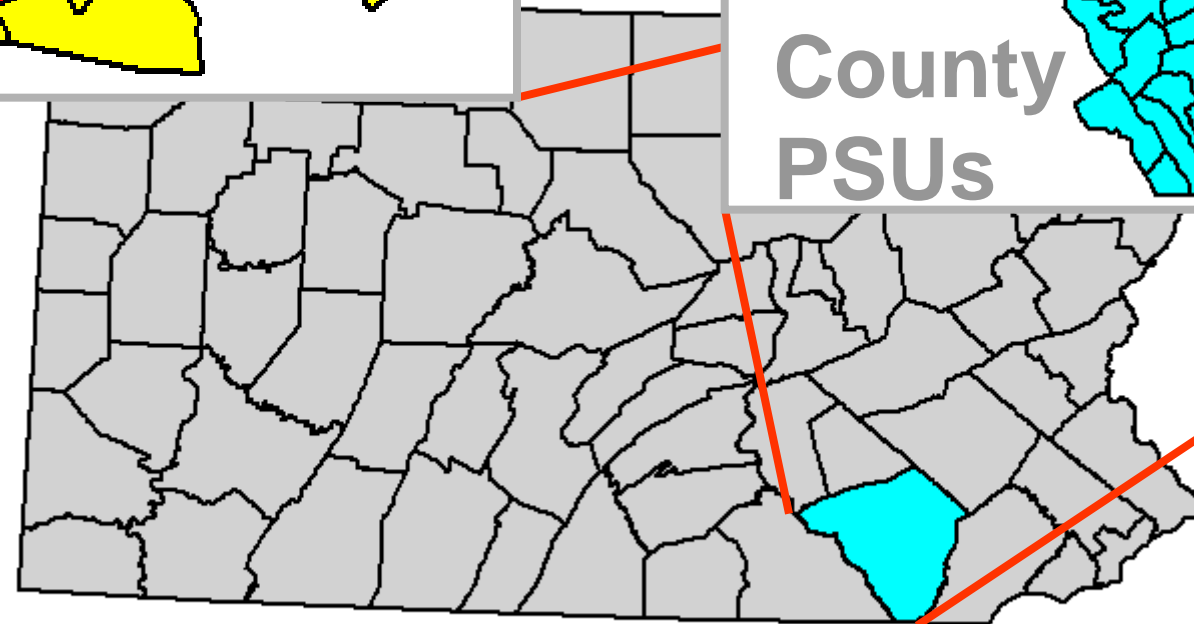


# Digitizing PSUs and Segments

PSU Segments



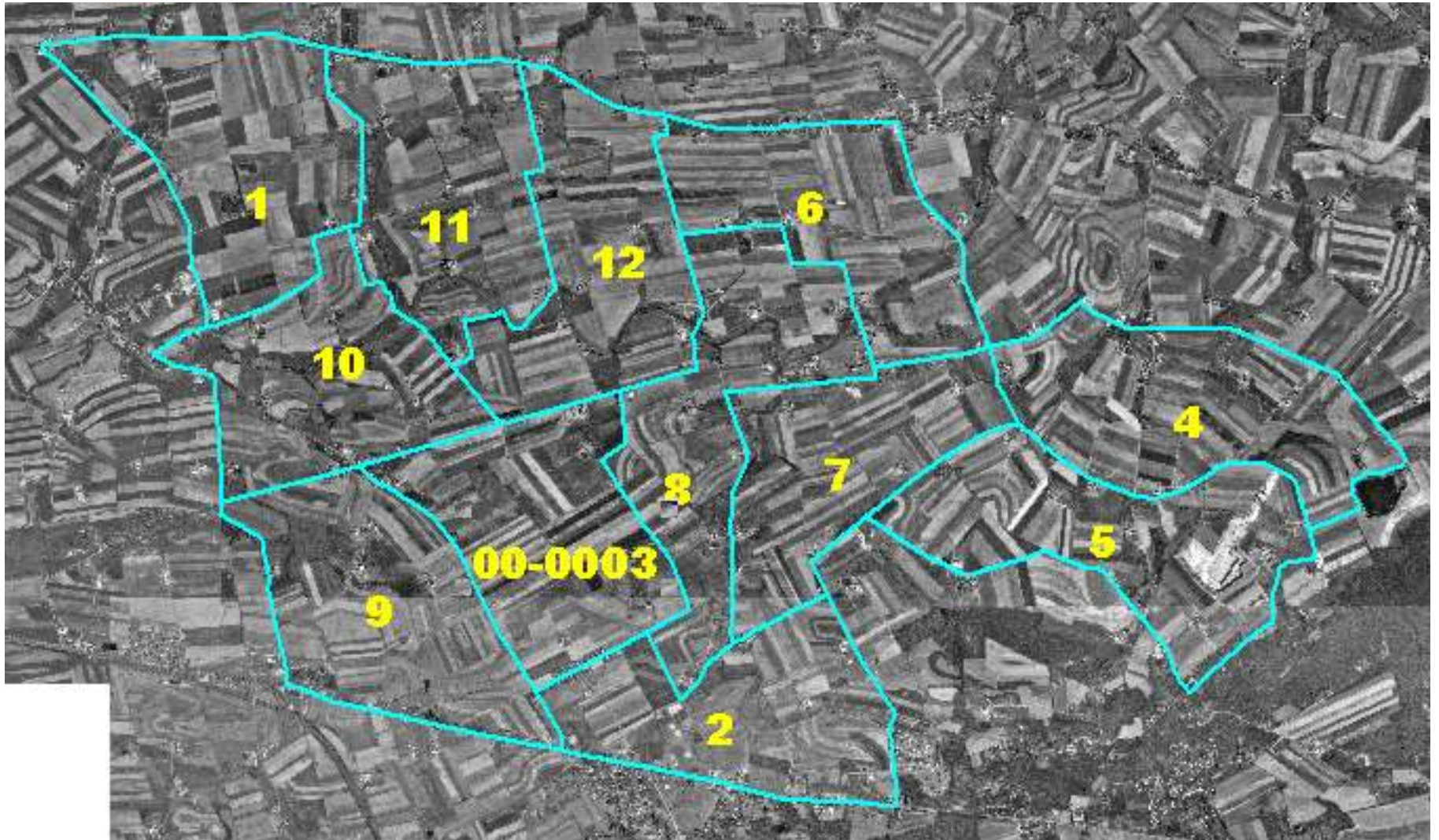
County  
PSUs



Counties

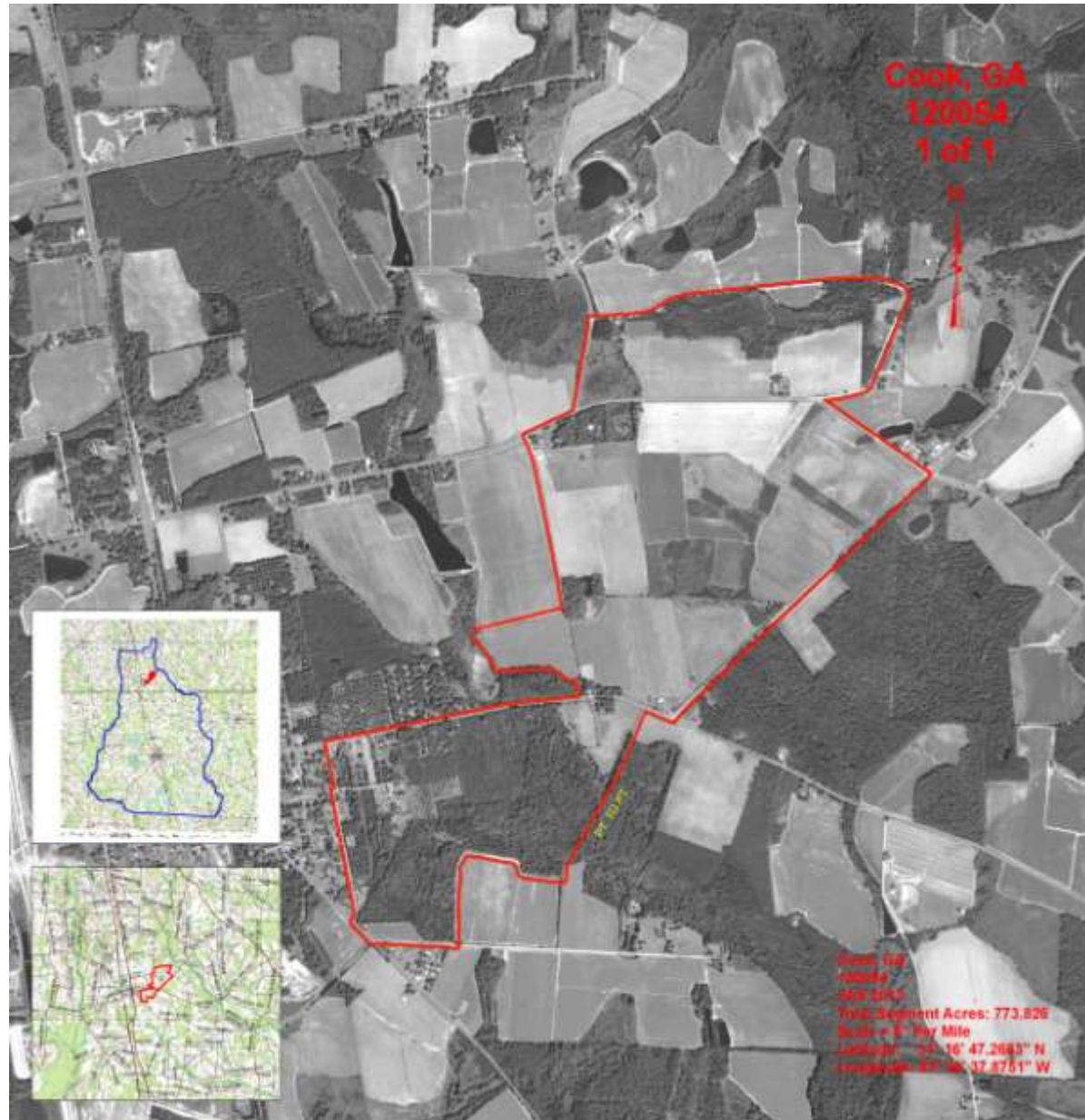


# Digitizing segments with PSU

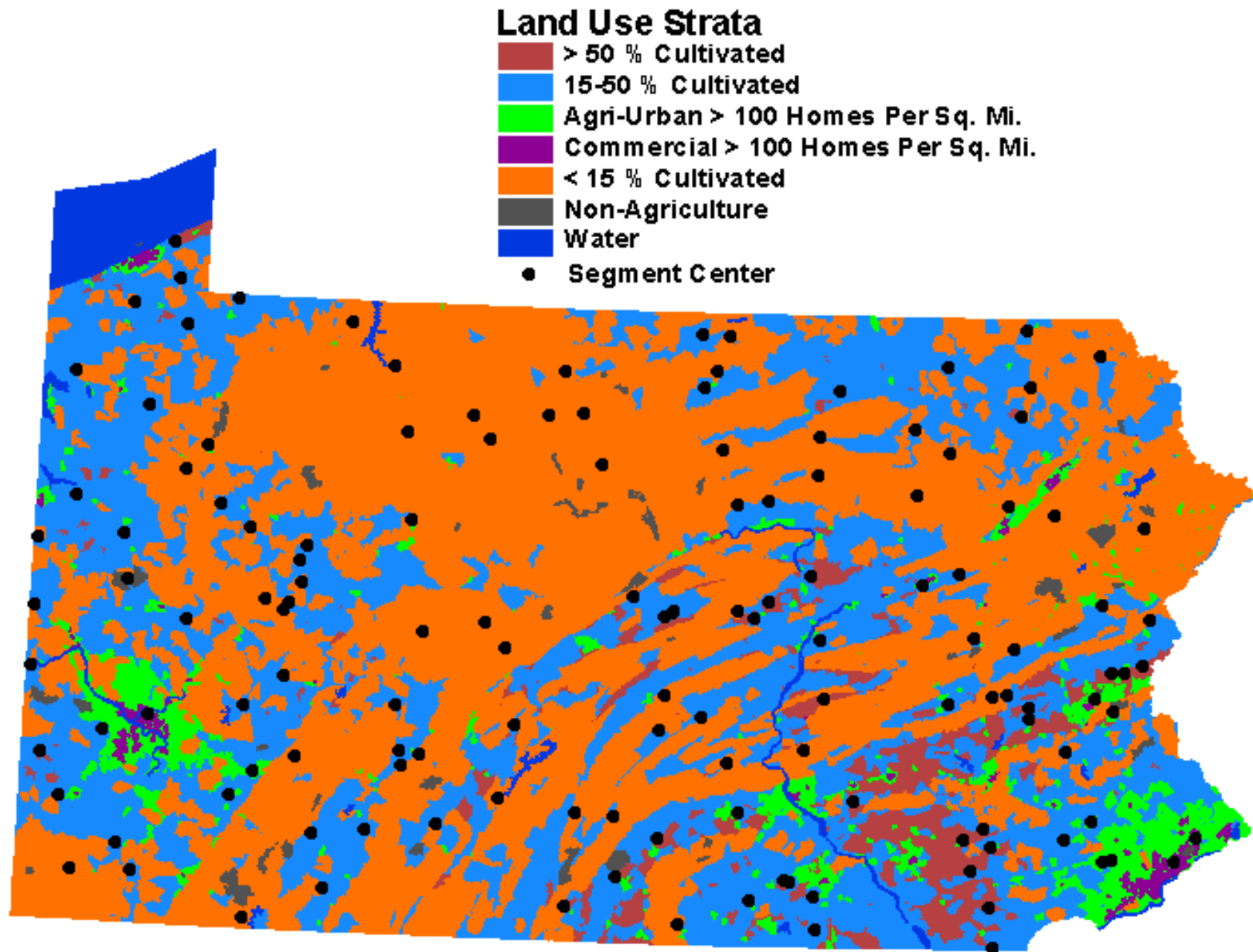




# Prepared Photo Enlargement

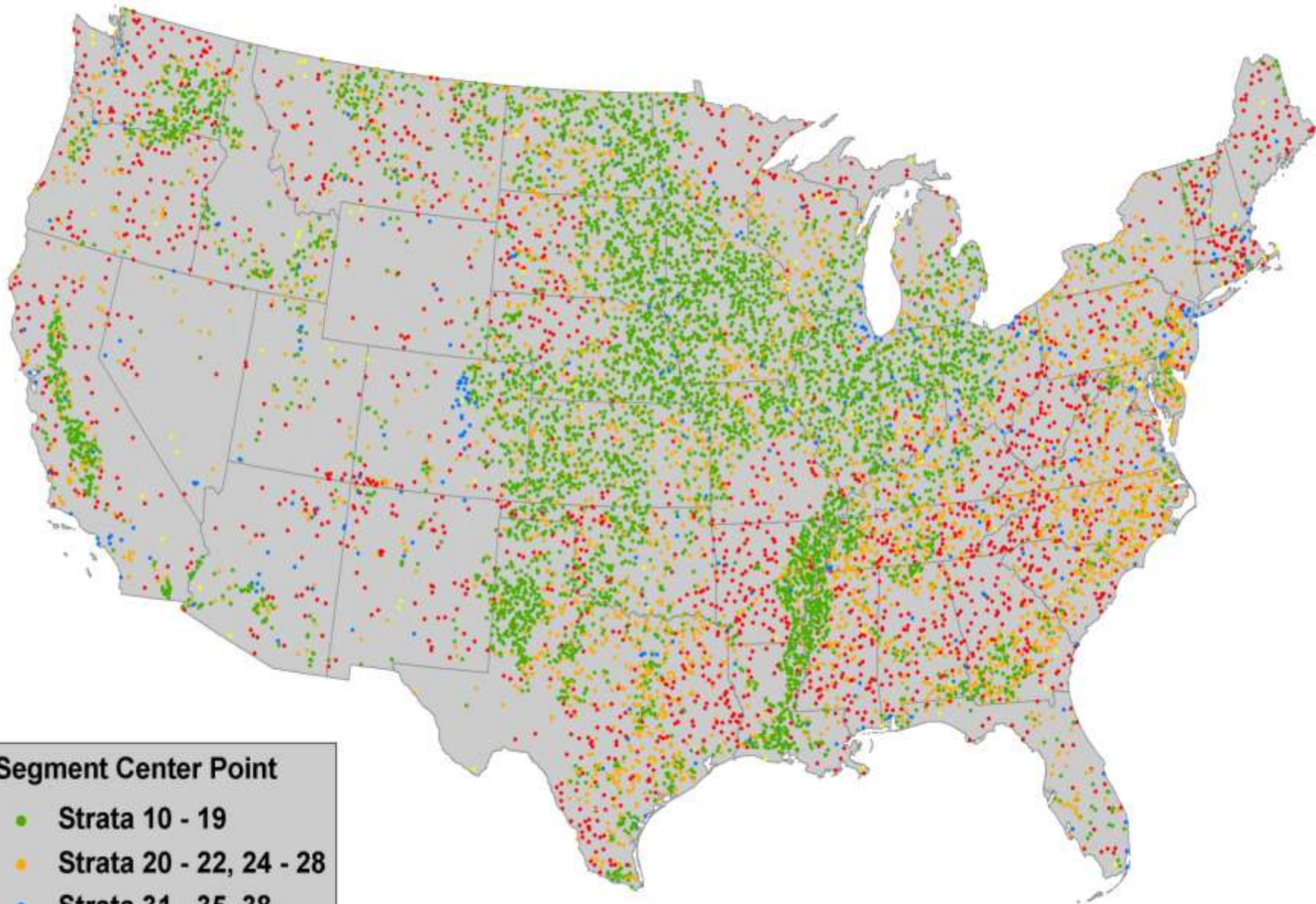


# Segment Center Locations





# 2010 JAS Segment Center Points by Stratum



## Segment Center Point

- Strata 10 - 19
- Strata 20 - 22, 24 - 28
- Strata 31 - 35, 38
- Strata 40 - 49
- Strata 50

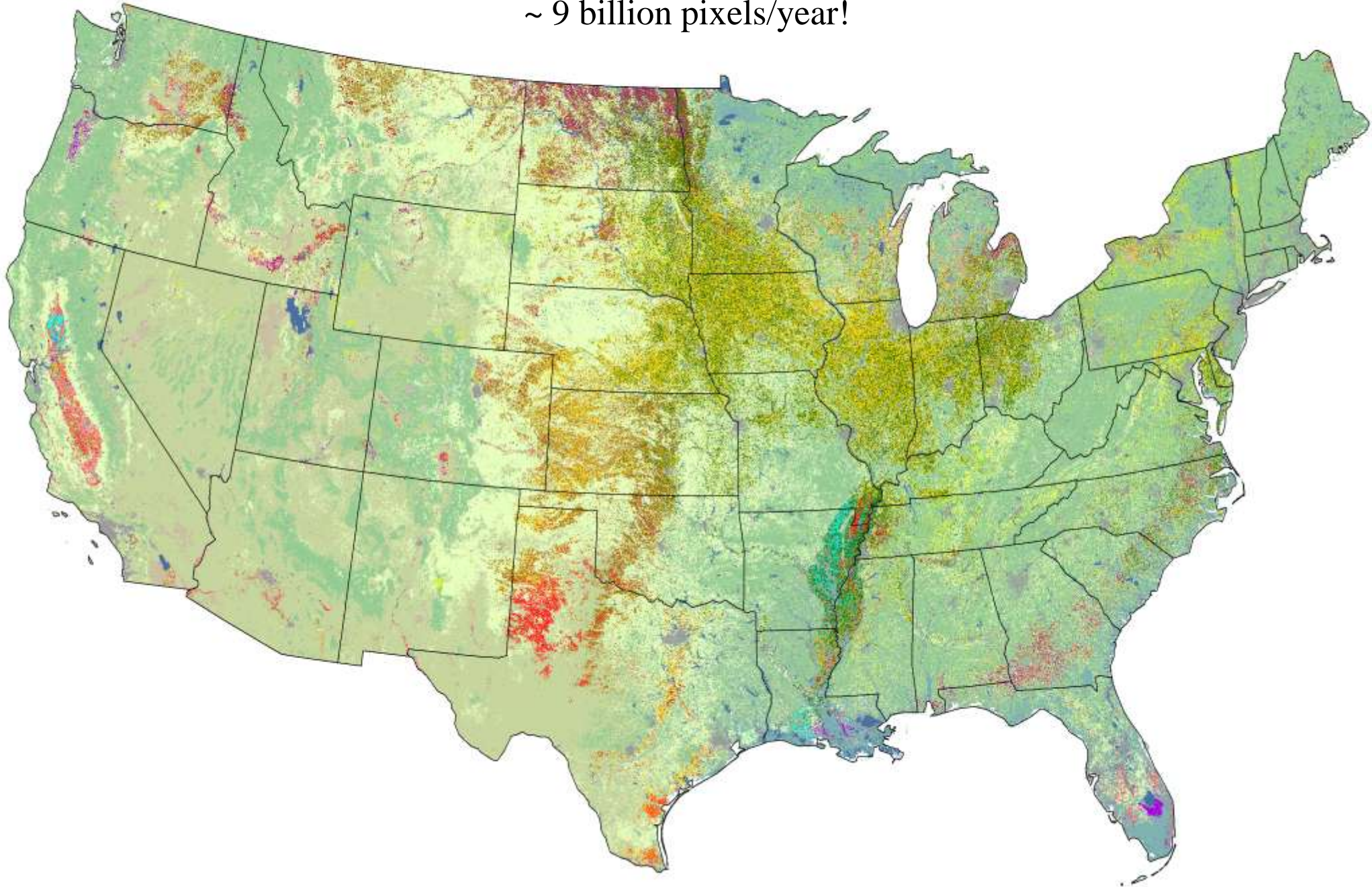


# NAIP for the Area Frame

- FTP Download as available for all US
  - Basis for all digitization
  - Printed for our field enumerators
- Store two most recent photos
- Tried using Web Service – pipe too small
- Segments used for 5 years

# 2008 – 2011 National Cropland Data Layers

~ 9 billion pixels/year!





# 2010 Craighead County Arkansas

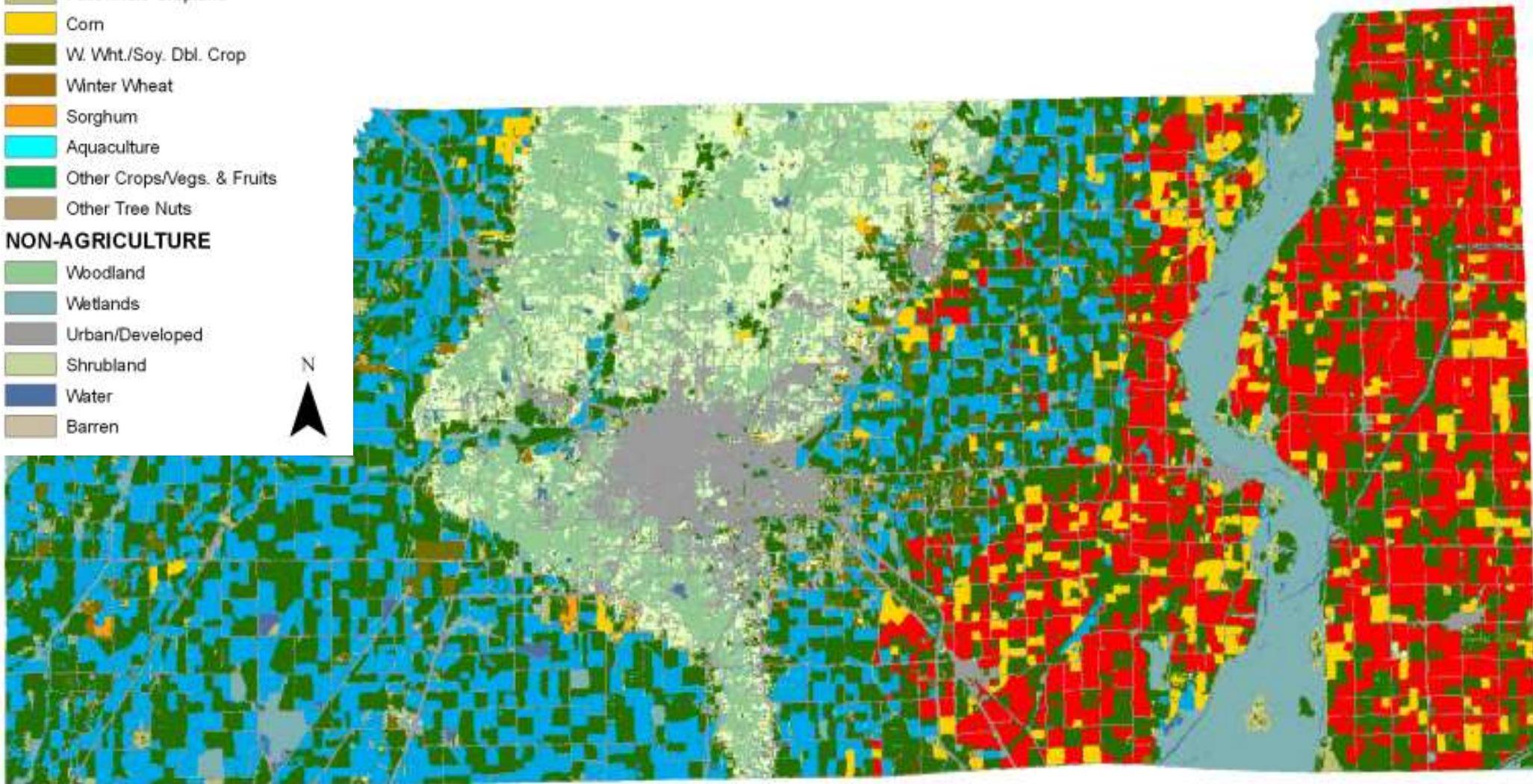
## Land Cover Categories

### AGRICULTURE

- Pasture/Grass
- Soybeans
- Rice
- Cotton
- Fallow/Idle Cropland
- Corn
- W. Wht./Soy. Dbl. Crop
- Winter Wheat
- Sorghum
- Aquaculture
- Other Crops/Vegs. & Fruits
- Other Tree Nuts

### NON-AGRICULTURE

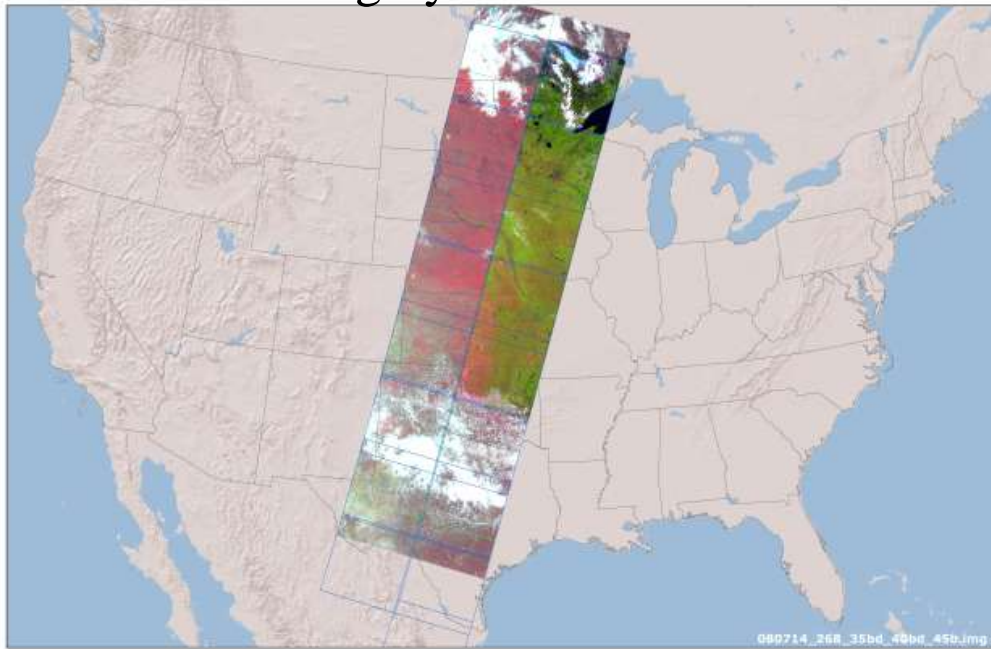
- Woodland
- Wetlands
- Urban/Developed
- Shrubland
- Water
- Barren



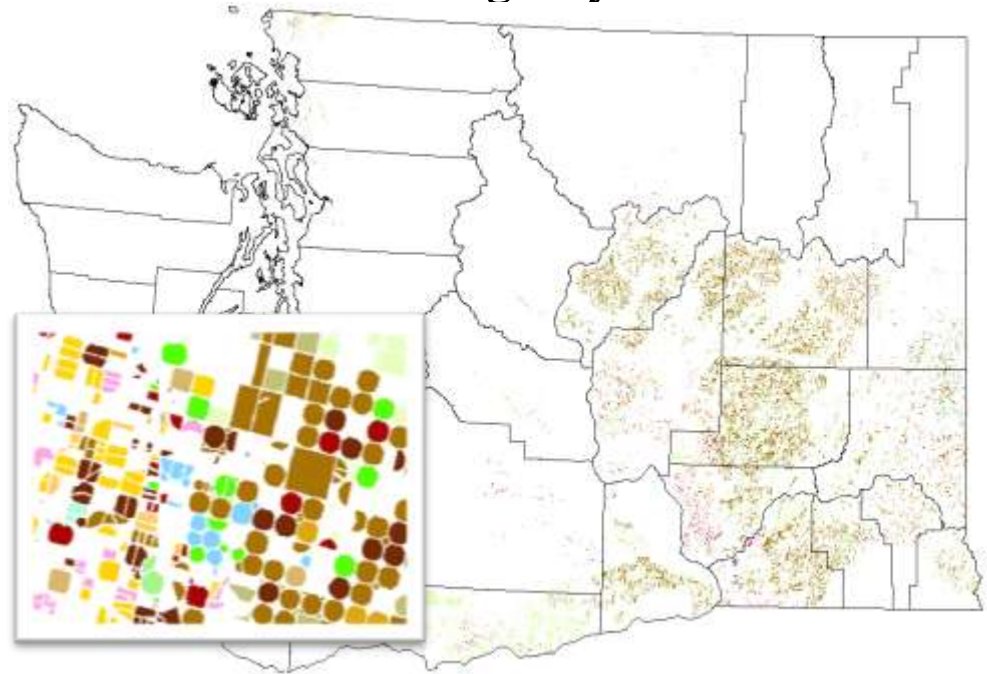


# Cropland Data Layer Inputs

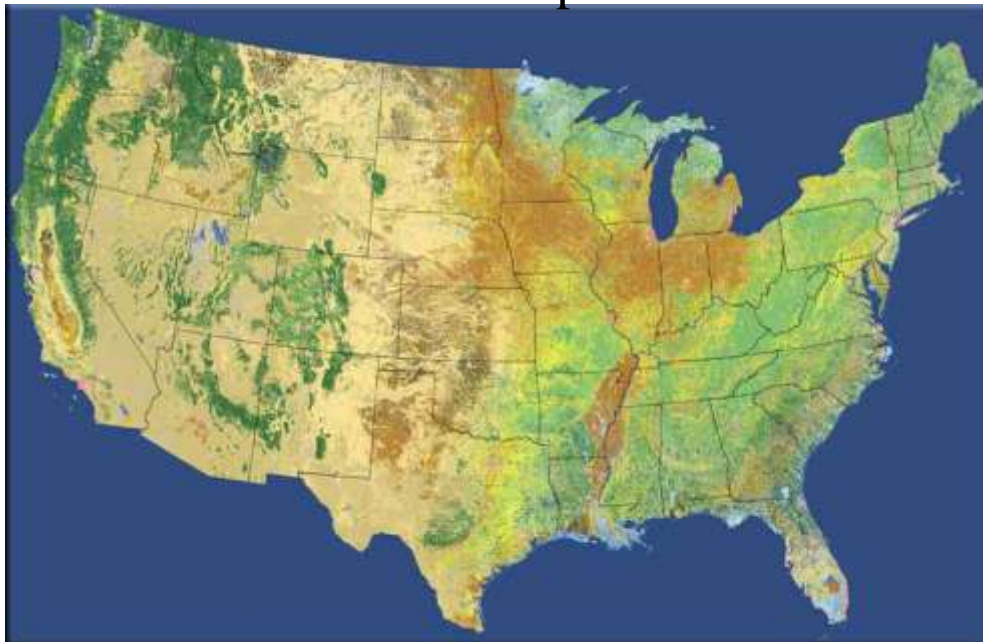
Satellite Imagery – DMC & Landsat TM



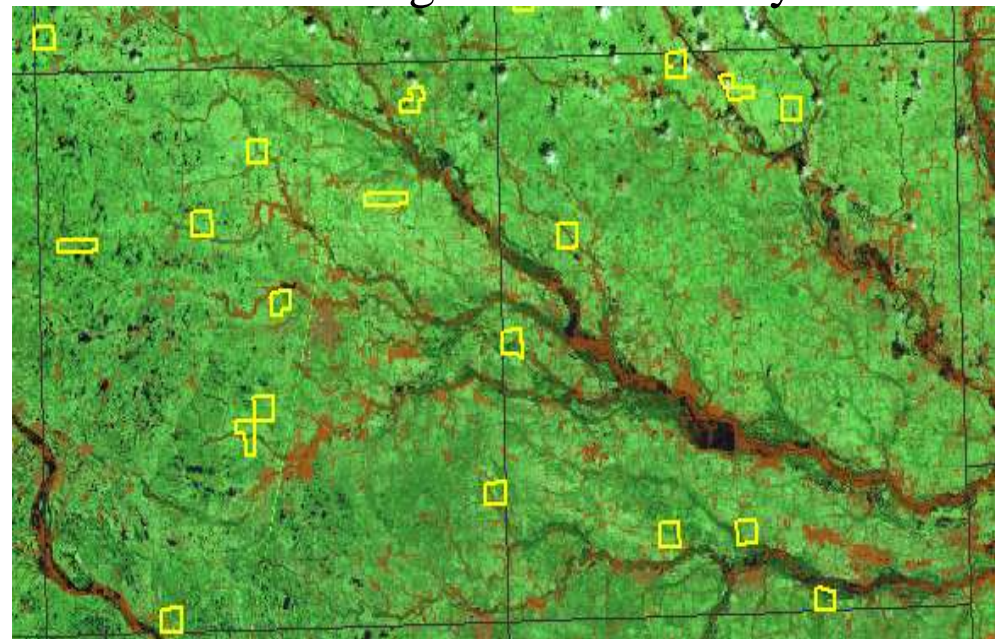
USDA Farm Service Agency/Common Land Un



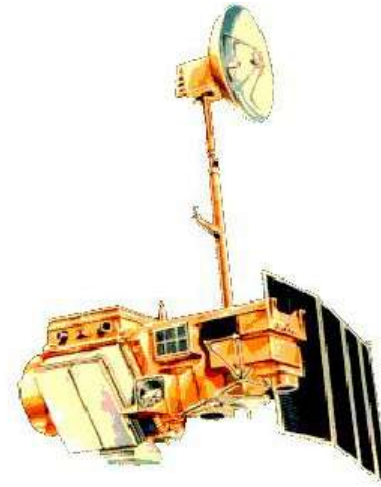
NLCD & Derivative products



NASS June Agricultural Survey



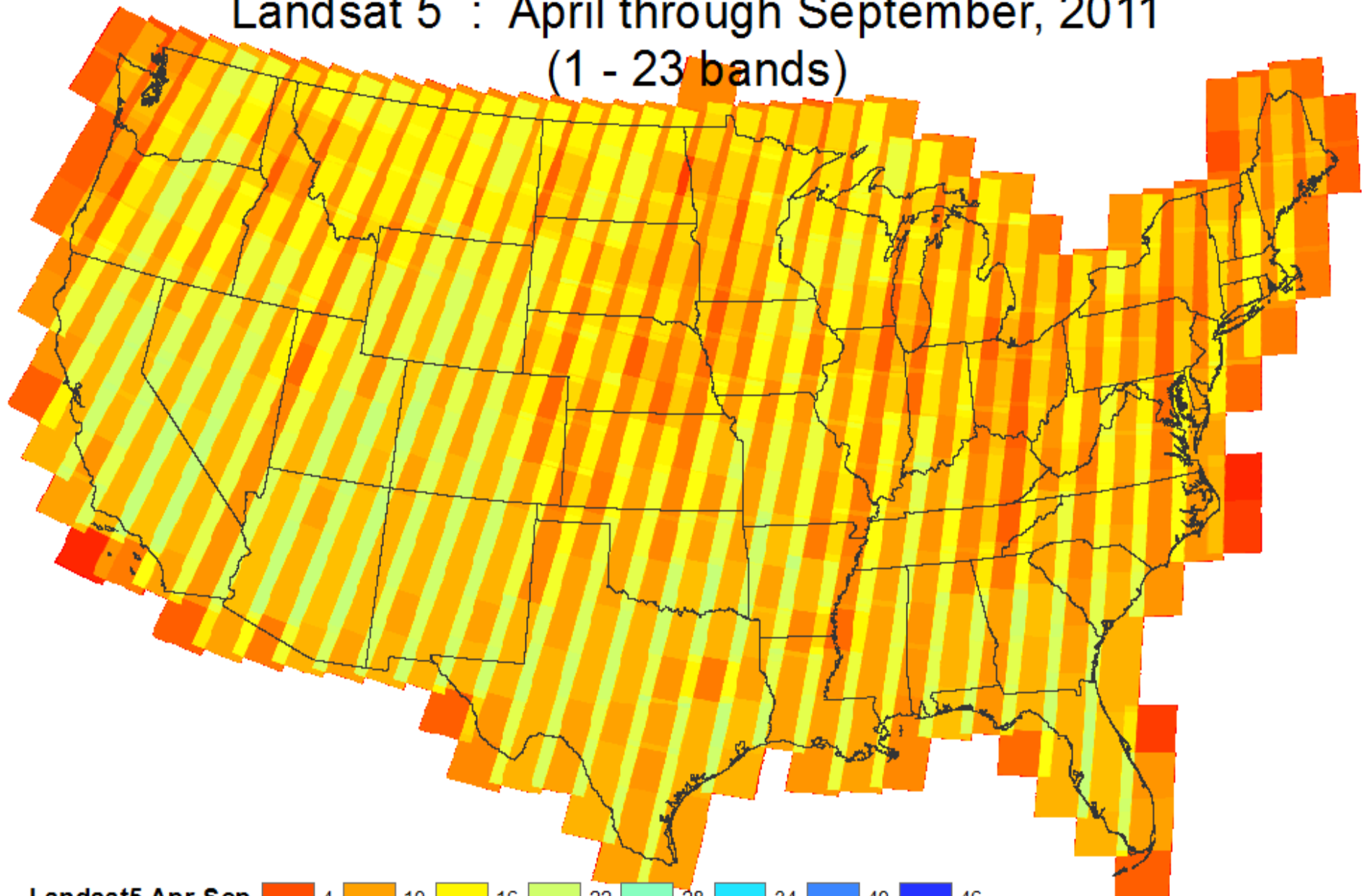
# Side by Side Comparison



	Deimos/UK2	Landsat 5
Launch Date	2009	1984
Resolution	22 meters	30 meters
Spectral Bands	B2: 0.52 – 0.60 B3: 0.63 – 0.69 B4: 0.77 – 0.90 (Green, Red, NIR)  3 bands total	B2: 0.52 – 0.60 B3: 0.63 – 0.69 B4: 0.75 – 0.90 B5: 1.55 – 1.75 (Green, Red, NIR, SWIR)  7 bands total
Swath Width	600 kilometers	185 kilometers
Revisit Rate	4 Days	16 Days



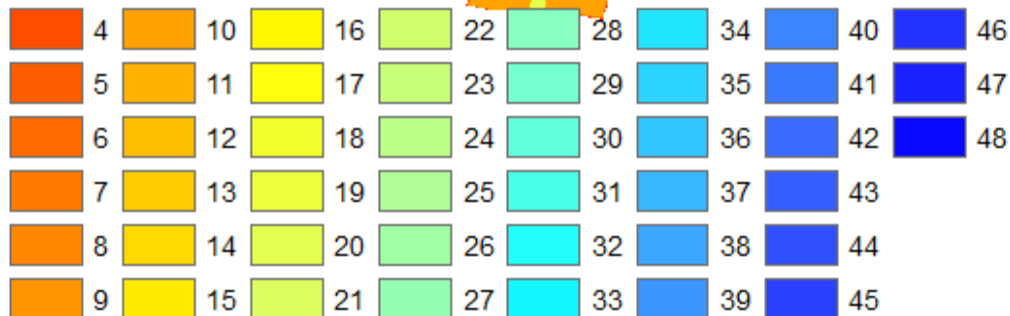
# Landsat 5 : April through September, 2011 (1 - 23 bands)



**Landsat5 Apr-Sep**

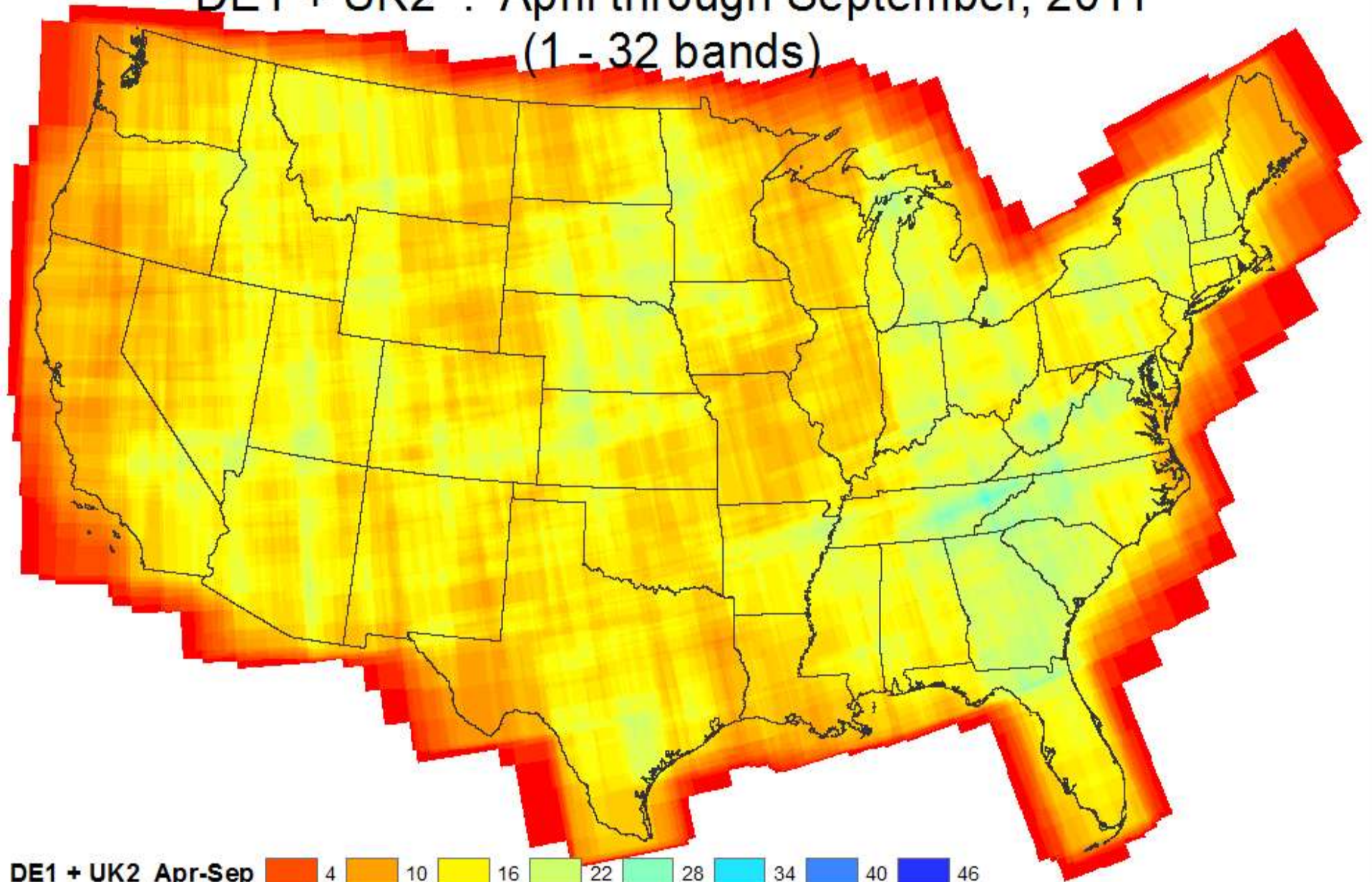
**Count**

0  
1  
2  
3



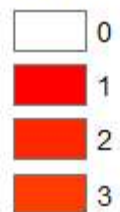


# DE1 + UK2 : April through September, 2011 (1 - 32 bands)



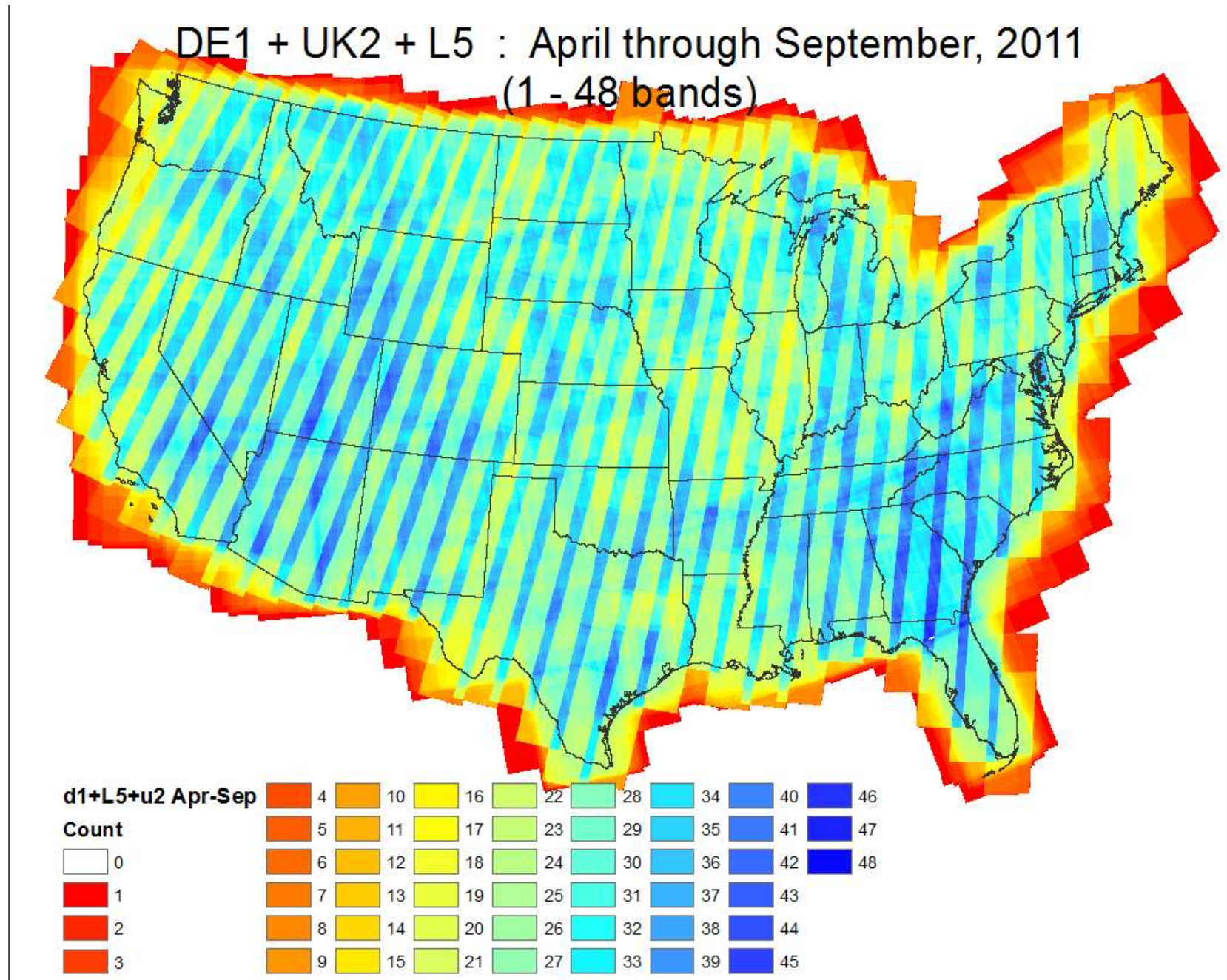
DE1 + UK2 Apr-Sep

Count





# DISASTER MONITORING CONSTELLATION (DMC) & LANDSAT 5 2011 COVERAGE





Crop-specific covers only	*Correct	Accuracy	Error	Kappa
-----	-----	-----	-----	-----
OVERALL ACCURACY**	2368649	83.10%	16.90%	0.7891

# Accuracy Statistics

Cover Type	Attribute Code	*Correct Pixels	Producer's Accuracy	Omission Error	Kappa	User's Accuracy	Commission Error	Cond'l Kappa
----	----	-----	-----	-----	-----	-----	-----	-----
Corn	1	460221	93.78%	6.22%	0.9272	94.47%	5.53%	0.9351
Sorghum	4	63253	57.82%	42.18%	0.5677	77.37%	22.63%	0.7660
Soybeans	5	1870	48.85%	51.15%	0.4882	94.02%	5.98%	0.9401
Sunflower	6	26389	61.28%	38.72%	0.6087	74.09%	25.91%	0.7375
Sweet Corn	12	905	54.75%	45.25%	0.5474	92.73%	7.27%	0.9272
Barley	21	7877	66.47%	33.53%	0.6636	71.55%	28.45%	0.7145
Durum Wheat	22	0	n/a	n/a	n/a	0.00%	100.00%	0.0000
Spring Wheat	23	2286	48.46%	51.54%	0.4839	49.02%	50.98%	0.4895
Winter Wheat	24	817165	92.79%	7.21%	0.9030	95.50%	4.50%	0.9389
Rye	27	285	14.57%	85.43%	0.1455	31.39%	68.61%	0.3135
Oats	28	4483	33.63%	66.37%	0.3344	47.41%	52.59%	0.4720
Millet	29	70479	79.66%	20.34%	0.7900	66.96%	33.04%	0.6606
Speltz	30	85	85.00%	15.00%	0.8500	49.13%	50.87%	0.4913
Canola	31	0	n/a	n/a	n/a	0.00%	100.00%	0.0000
Flaxseed	32	0	n/a	n/a	n/a	0.00%	100.00%	0.0000
Safflower	33	577	31.26%	68.74%	0.3120	19.97%	80.03%	0.1992
Alfalfa	36	174154	72.85%	27.15%	0.7109	85.82%	14.18%	0.8472
Other Hay	37	54825	39.87%	60.13%	0.3862	80.78%	19.22%	0.7995
Sugarbeets	41	4381	80.64%	19.36%	0.8061	83.04%	16.96%	0.8301
Dry Beans	42	12029	68.64%	31.36%	0.6844	54.83%	45.17%	0.5459
Potatoes	43	12742	85.17%	14.83%	0.8511	91.00%	9.00%	0.9096
Other Crops	44	0	0.00%	100.00%	0.0000	n/a	n/a	n/a
Misc. Veggies. & Fruits	47	0	n/a	n/a	n/a	0.00%	100.00%	0.0000
Watermelons	48	25	6.35%	93.65%	0.0634	39.68%	60.32%	0.3968

**Producer's Accuracy:** relates to the probability that a ground truth pixel will be correctly mapped and measures errors of omission.

**Errors of Omission:** occur when a pixel is excluded from the correct category

**User's Accuracy:** indicates the probability that a pixel from classification actually matches the ground truth data and measures errors of commission

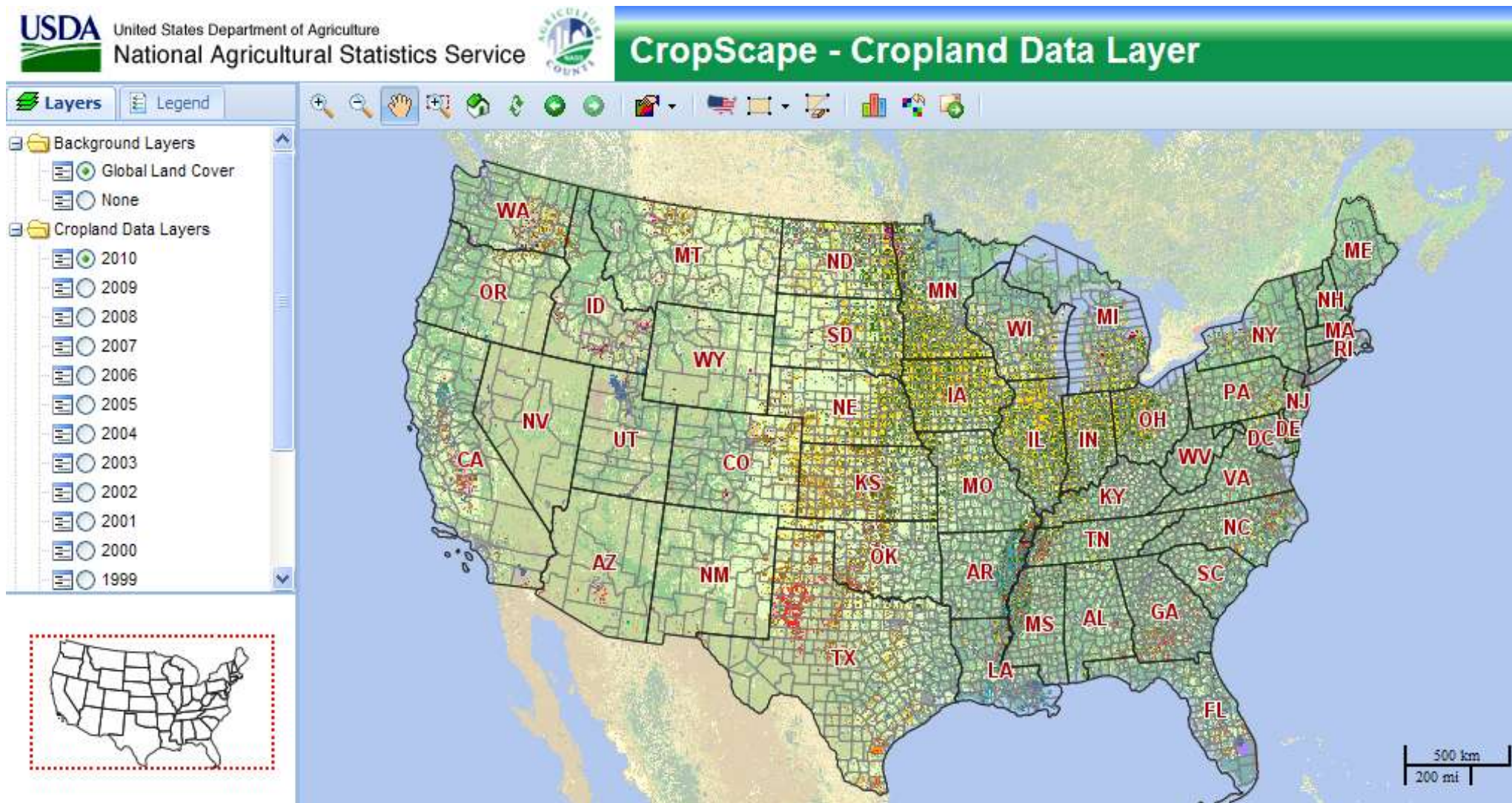
**Errors of Commission:** occur when a pixel is included in an incorrect category

# Producer Accuracy Comparisions

State	Both Satellites	Landsat only	DMC only
California	85.1	<b>82.5</b>	76.4
Montana	71.6	67.2	<b>68.9</b>
Colorado	81.1	Not possible	<b>81.0</b>
North Carolina	81.7	69.0	<b>81.6</b>



# <http://nassdata.gmu.edu/CropScape>



Harmonize ALL historical CDL products to standards:  
color scheme, categories, projection, metadata



# CropScape Portal Defined

USDA United States Department of Agriculture National Agricultural Statistics Service

**Visual Tools** **Point Query** **Stats/Change/Download**

**Layer/Legend**

**AOI Query**

**Map Overview**

The screenshot displays the CropScape Portal interface. The main map shows the United States with various crop layers overlaid. The legend on the left lists the following crops: Corn, Cotton, Rice, Sorghum, Soybeans, Tobacco, Sweet Corn, Popcorn or Ornamental Corn, Mint, Barley, Durum Wheat, Spring Wheat, Winter Wheat, Other Small Grains, Winter Wheat/Soybeans Db1., Rye, Oats, Millet, Speltz, Canola, Flaxseed, Safflower, and Rape Seed. The interface includes a 'Layers' panel on the left, a 'Legend' panel on the right, and a 'Map Overview' panel at the bottom left. The 'Visual Tools' panel at the top left contains icons for zooming, panning, and other map navigation functions. The 'Point Query' panel at the top center contains icons for querying points on the map. The 'Stats/Change/Download' panel at the top right contains icons for statistics, changes, and downloading data. The 'AOI Query' panel at the top right contains icons for querying areas of interest. The 'Map Overview' panel at the bottom left shows a small map of the United States with a red box indicating the current map area. The main map area shows a detailed view of the United States with various crop layers overlaid. The legend on the left lists the following crops: Corn, Cotton, Rice, Sorghum, Soybeans, Tobacco, Sweet Corn, Popcorn or Ornamental Corn, Mint, Barley, Durum Wheat, Spring Wheat, Winter Wheat, Other Small Grains, Winter Wheat/Soybeans Db1., Rye, Oats, Millet, Speltz, Canola, Flaxseed, Safflower, and Rape Seed. The interface includes a 'Layers' panel on the left, a 'Legend' panel on the right, and a 'Map Overview' panel at the bottom left. The 'Visual Tools' panel at the top left contains icons for zooming, panning, and other map navigation functions. The 'Point Query' panel at the top center contains icons for querying points on the map. The 'Stats/Change/Download' panel at the top right contains icons for statistics, changes, and downloading data. The 'AOI Query' panel at the top right contains icons for querying areas of interest. The 'Map Overview' panel at the bottom left shows a small map of the United States with a red box indicating the current map area. The main map area shows a detailed view of the United States with various crop layers overlaid.